

**Off-Hook Visual Message Waiting Indicator****Field of the Invention:**

This invention is related to the field of telephony, and in particular to the field of  
5 alerting a user to a waiting voicemail message.

**Background of the Invention:**

There are two principal ways for a user to configure a home telephone system to  
provide a messaging service to an incoming caller. A first way is to have a telephone  
10 answering device, also known as an "answering machine" integrated into or coupled to a  
telephone at the user's home. Such a device will typically enter an off-hook or answered  
state after a predetermined number of unanswered rings associated with an incoming call,  
and then play an outgoing message (OGM) to an incoming caller, after which the  
incoming caller is offered the opportunity to record an incoming message. The  
15 answering machine has a drawback in that it cannot record a message if the telephone  
line is busy, i.e., the user is engaged in a previous call.

A second way is for the user to purchase a service from a telephone service  
provider wherein the telephone service provider will store incoming messages at a central  
location, and play the incoming messages to the user upon request. This second option is  
20 advantageous in that the OGM and recording activities occur between the central location  
and the incoming caller, and thus allow for the issuance of the OGM and recording of the  
incoming message, even if the target telephone is busy because the user is engaged in a  
previous telephone call.

A disadvantage of a user procuring messaging services from a service provider is that an incoming message may be waiting for the user and the user may not be aware of the stored incoming message. This can be contrasted with the traditional answering machine option, wherein the answering machine typically illuminates an LED or seven-segment display to inform the user of the existence of or number of stored messages. To overcome this drawback, a feature known as Voicemail Message Waiting Indicator (VMWI) was developed, wherein the service provider sends a signal to the user's telephone to cause it to illuminate an LED indicative of one or more waiting voicemail messages. This feature is described, for example, in BellCore Standard TR-NWT-001401, "Visual Message Waiting Indicator, Generic Requirements, FSD-01-02-2000, incorporated herein by reference.

A drawback of the traditional VMWI service is that it provides for the issuance of the VMWI signal only if the user's telephone is in an on-hook condition, i.e., is not engaged in a telephone call. If the user's telephone is off-hook, the traditional VMWI service waits until the telephone transitions to the on-hook state, and then provides the VMWI signal. Thus, if a user is engaged in a telephone call, the user will not be made aware of a new incoming message until after the telephone call is completed. This drawback may be of even greater magnitude if the telephone call is lengthy, because the standard allows for the VMWI signal to be dropped completely, i.e., not delivered, if there is a wait of more than 2.5 hours.

There is therefore a need for a VMWI service and apparatus that provides a VMWI signal even if a user's telephone is off-hook. There is also a need for a telephone adapted to receive a VMWI signal when off-hook, and to provide an indication of the

receipt of the VMWI signal, such as the illumination of an LED, or the display of caller ID data associated with the message leaving party.

### **Summary of the Invention:**

5           These needs are addressed by employing the present invention, a first embodiment of which is directed to a method of providing a visual message waiting indicator signal to an off-hook telephone. This method includes the step of receiving a voicemail message at a central location, and also includes the step of sending a visual message waiting indicator signal from the central location and destined for the off-hook  
10   telephone.

          In an alternative embodiment, a method of receiving a visual message waiting indicator signal in an off-hook telephone includes the steps of being in an off-hook condition, and receiving a visual message waiting indicator signal. This method may further include the step of displaying a visual message waiting indicator based on the  
15   received visual message waiting indicator signal. This method may also include the step of receiving an alert signal, and the step of transmitting an acknowledgement signal in response to the alert signal.

          In another alternative embodiment, a telephone includes a visual message waiting indicator, and an interface unit adapted to couple the telephone to a network, such that the  
20   telephone is in an off-hook condition when coupled to the network and engaged in a communication activity, and is in an on-hook condition when coupled to the network and not engaged in a communication activity, wherein the interface unit is adapted to receive a visual message waiting indicator signal when in the off-hook condition.

In yet another alternative embodiment, a telephone switch includes a message storage unit adapted to receive a voicemail message associated with a telephone when the telephone is in an off-hook condition, and a visual message waiting indicator signal transmission unit adapted to transmit a visual message waiting indicator signal to the  
5 telephone in the off-hook condition.

**Brief Description of the Drawing:**

Objects and advantages of the various embodiments of the invention will be apparent to one of skill in the art upon review of the following detailed description in  
10 light of the drawing, wherein:

Figure 1 is a simplified block diagram of a telephone and a central device coupled through a network according to a first embodiment according to the invention;

Figure 2 is an exemplary simplified operational flowchart depicting the operation of a central device according to the invention;

15 Figure 3 is another exemplary simplified operational flowchart depicting the operation of a central device according to the invention;

Figure 4 is yet another exemplary simplified operational flowchart depicting the operation of a central device according to the invention;

20 Figure 5 is an exemplary simplified operational flowchart depicting the operation of a telephone according to the invention;

Figure 6 is another exemplary simplified operational flowchart depicting the operation of a telephone according to the invention;

Figure 7 is yet another exemplary simplified operational flowchart depicting the operation of a telephone according to the invention;

Figure 8 is still another exemplary simplified operational flowchart depicting the operation of a telephone according to the invention; and

5        Figure 9 is yet another exemplary simplified operational flowchart depicting the operation of a telephone according to the invention.

### **Detailed Description:**

Figure 1 depicts a simplified block diagram of a telephone 105 and a central  
10        device 107 coupled via a network 109. The network 109 may be any type of network, such as a public switched telephone network (PSTN), an internet, an intranet, any form of wired network or wireless network, etc. Similarly, telephone 105 may be any type of telephone, such as a corded telephone, a cordless telephone, a wireless telephone, a cellular telephone, a campus or PBX-based telephone, etc. Likewise, central device 107  
15        may be a telephone switch of any type, an internet-based switch, a PBX, etc.

Telephone 105 includes an interface unit 111, a visual message waiting indicator 113, and conventional telephone functionality 115. Operationally, the interface unit 111, which may include, for example, a conventional telephone line interface, couples telephone 105 to the network 109 and is adapted, according to the invention, to receive a  
20        visual message waiting indicator signal when telephone 105 is in an off-hook condition. Accordingly, even if a user is engaged in a telephone call, or connected to an internet service provider to surf the web, or engaged in any other activity during which telephone 105 is off-hook, the user may still be alerted to the presence of one or more waiting

messages stored at the central device 107 by the activation of the visual message waiting indicator.

It is well known, of course, that receiving conventional Caller ID data while engaged in a web-based activity via a modem will likely be fatal to any modem connection. In such a case, the user may be presented the option to turn off the off-hook feature of the invention, in a manner similar to that employed to turn off a Caller ID feature, such as, for example, by activating \*-7-0. The deactivation of the off-hook visual message waiting indicator may be accomplished as part of the same operation employed to turn off Type II Caller ID, or may be accomplished as a separate operation.

In one example of the invention, the user may be engaged in a conversation with a second party, and may receive an indication via a call waiting feature that a third party is trying to contact the user. If the user elects not to interrupt the conversation with the second party, and the third party elects to leave a message for the user, then according to the invention, the user will be alerted by way of the visual message waiting indicator 113 that a message has been left for the user while still engaged in the conversation with the second party. In one example, the visual message waiting indicator 113 may be a conventional light emitting diode (LED) based device, as is known in the art. Another alerting mechanism may be, for example, a tone that is presented to a speaker, such as a speaker in an earpiece of the user's telephone, but is not presented to the far end party.

Alternatively, the visual message waiting indicator may comprise, either alone or in addition to the conventional LED, a display providing information relating to the stored message. For example, the display may provide call related information, such as caller ID data, associated with the third party, may provide an indication regarding the

length of the stored message (e.g., "30 seconds"), may provide an indication regarding the time the message was received, and/or may provide a textual depiction of a portion of the stored message. This display may also be the display used to provide conventional caller ID information, if telephone 105 is so configured and if the user subscribes to such a service.

If the user does subscribe to a Caller ID service that includes Call Waiting (i.e., Type II Caller ID), then an advantage of the invention may simply be that the user is made aware of the fact that an incoming caller, who the user chose to ignore based, for example, on caller ID data associated with the incoming call, has decided to leave a message. If, on the other hand, the user does not subscribe to Caller ID, then the advantage of the invention may be greater as the visual message waiting indication provided to the user may be the first time the user is even aware that somebody else is trying to contact the user. Thus, even in the embodiment where the visual message waiting indicator is simply a conventional LED, the provision of the visual message waiting indicator signal during the off hook condition according to the invention is very advantageous as the user may otherwise be unaware of the attempted contact and may thus persist needlessly in a telephone call, web surfing experience, etc.

To facilitate the reception of the visual message waiting indicator signal by telephone 105, the central device 107 includes an interface unit 117, a controller 119, a message storage unit 121, and a visual message waiting indicator signal transmission unit 123, as well as conventional switch functionality 125. According to the invention, controller 119 will cause visual message waiting indicator transmission unit 123 to

transmit a visual message waiting indicator signal via interface unit 117 and network 109 to telephone 105 to indicate the presence of a message in message storage unit 121.

Central device 107 may also include, according to one embodiment of the invention, an alerting unit 127 and an acknowledgement receive unit 129.

5 Correspondingly, telephone 105 may include a muting mechanism 131 coupled to a conventional microphone 133 and a conventional speaker 135. Operationally, these elements may be employed to provide for controlled issuance of the visual message waiting indicator signal by the visual message waiting indicator signal transmission unit 123.

10 In one particular example, prior to issuance of the visual message waiting indicator signal, controller 119 directs alerting unit 127 to issue an alerting signal to telephone 105. In response to the alerting signal, muting mechanism 131 may mute transducers in telephone 105, such as microphone 133 and/or speaker 135 to minimize or eliminate disruption of the visual message waiting indicator signal by signals produced  
15 by the microphone 133 and to minimize or eliminate annoying sounds associated with the signal from emanating from the speaker 135.

This alerting and muting may be accomplished in a manner similar to that involved in conventional Type II Caller ID, as described in Bellcore specification GR-30-CORE, or may include aspects of U.S. Patent No. 5,943,407, entitled Performance  
20 Enhancement of Tone Detection And FSK Detection Using Hybrid Echo Cancellation, and issued to Davis, et al., each of which is incorporated herein by reference. Such an approach may be implemented, for example, by adding a new parameter to the present



Type II Multiple Data Message Format as described for example, in Bellcore documents TR-NWT-001188 and TR-NWT-000575, incorporated herein by reference.

Alternatively, a signaling scheme may be employed by which the visual message waiting indicator information is sent by the central location and received by the telephone  
5 during silent periods in an on-going telephone conversation.

In an alternative example, the alerting signal may elicit an acknowledgement signal from telephone 105 to inform the central device 107 that telephone 105 is ready and able to receive the visual message waiting indicator signal. This acknowledgement may also be configured in a manner similar to that utilized in the Type II Caller ID  
10 options described in the above references.

Figure 2 presents an operational flowchart depicting an embodiment of the invention. At step 202, the message storage unit 121 of central device 107 receives a voicemail message, such as from an incoming caller, and at step 204 the visual message waiting indicator signal transmission unit 123 of central device 107 issues a visual  
15 message waiting indicator signal via interface unit 117 and network 109 to telephone 105 when telephone 105 is in an off-hook condition.

Figure 3 depicts an alternative operational flowchart, wherein step 204 from Figure 2 includes the issuance of an alerting signal from alerting unit 127 at step 204a, and the transmission of the visual message waiting indicator signal at step 204b. Figure 4  
20 depicts another alternative wherein an acknowledgement signal is received at step 204c.

Figure 5 provides an exemplary simplified operational flowchart for the telephone 105. At step 501, telephone 105 is in an off-hook condition, and at step 503 telephone 105 receives a visual message waiting indicator signal. This indicator may be used for

any purpose by telephone 105, such as the typical purpose of displaying a visual message waiting indicator, as shown in the step 505 of the alternative embodiment of Figure 6.

Thus, according to this embodiment of the invention, even though telephone 105 is off hook, a user will be able to be made aware of the fact that a message has been left for the  
5 user at a central location, such as in message storage unit 121 of central device 107.

Figure 7 provides an alternative example, wherein the display is not merely an indication that a message is stored in the message storage unit 121, but also includes an indication of the Caller ID data associated with the message leaving party. Thus, for example, a display, such as a conventional LCD display typically used to display Caller  
10 ID data associated with incoming calls, may be employed according to the invention to display a message, such as "MESSAGE FROM FRANK SMITH" or "MESSAGE FROM 610-123-4567". If necessary, based on limited display space, the display may be configured to toggle between "MESSAGE FROM" and "FRANK SMITH", or between "MESSAGE FROM" and "610-123-4567", depending on the elected implementation.

15 Alternatively, if there is more than one message stored, information relating to the plurality of messages may be provided to telephone 105 and displayed on the display, such as, for example, a continuing series of displays. For example, a first display may include "3 MESSAGES FROM" while each of the next three displays includes a name and/or telephone number of a party associated with each of the three messages. After the  
20 information identifying the party associated with the third message is displayed, the display will then proceed to the "3 MESSAGES FROM" display, and will continue in this cyclical fashion until the feature is disabled, until the user accesses one or more of the messages, or until an additional message is added and the display information is thus

updated. This cycle may include additional information, such as the duration of a message or the time of a message.

Alternatively, the information received by and displayed by telephone 105 may include a portion of the stored message, such as the first few words of the stored message, to give the user an indication about the subject of the stored message. The display may thus also be configured particularly for this application, or may again take advantage of a conventional display and employ the above concepts to show portions of the message at appropriate times. If the message is originally recorded as a voice message, one way to achieve this alternative functionality is for the central device 107 to include a speech-to-text module that converts at least a portion of a stored voice message into text for transmission to the telephone 105. Such a module may be configured, for example, as a functional block within a processor, such as a digital signal processor.

Figure 8 provides another alternative flowchart that includes step 507, wherein telephone 105 receives an alert signal at step 507. At step 509, muting mechanism 131 mutes one or more transducers, such as microphone 133 or speaker 135, to facilitate the transfer of the visual message waiting indicator signal, which may include caller ID data, or may simply be an indicator signal. Figure 9 provides yet another alternative flowchart whereby telephone 105 transmits an acknowledgement signal at step 511 prior to the muting step 509.

The invention thus provides various alternative embodiments by which a visual message waiting indicator signal, and/or data corresponding to a message or a message leaving party, may be transmitted from a central location to a telephone, and may be received by a telephone from a central location, even when the telephone is in an off-

hook condition. Based on an understanding of these various embodiments, one of skill in the art is likely to conceive of alternative embodiments that are not specifically enumerated here, but that are clearly within the scope of the invention.